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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:  
Abhay S. Kant et al.

Serial No.: 10/720,817

Filed: November 24, 2003

For: METHOD AND APPARATUS FOR  
DETECTING RUB IN A  
TURBOMACHINE

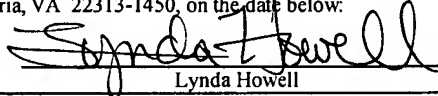
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Group Art Unit: 2863

Examiner: Lau, Tung S.

Atty. Docket: 133918-1/YOD  
GERD:0332

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| Date  | Lynda Howell   |

**APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37**

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on December 21, 2005, and received by the Patent Office on December 28, 2005.

The Commissioner is authorized to charge the requisite fee of \$500.00, and any additional fees which may be necessary to advance prosecution of the present application, to Account No. 07-0868, Order No. 133918-1/YOD (GERD:0332).

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1. **REAL PARTY IN INTEREST**

The real party in interest is General Electric Company, the Assignee of the above-referenced application by virtue of the Assignment to General Electric Company by Abhay Sudhakar Rao Kant, Nicholas Giannakopoulos, Joseph Robert Toth, Vivek Venugopal Badami, Mark M. Dimond, and Jitendra Kumar, recorded at reel 014746, frame 0561, and dated November 24, 2003. Accordingly, General Electric Company, as the parent company of the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-4 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal.

4. **STATUS OF AMENDMENTS**

There are no outstanding amendments to be considered by the Board.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates generally to the field of methods and apparatus for monitoring rubs in turbomachinery. *See* Application, page 1, paragraph [0001]. More particularly, the disclosed technique analyzes data obtained from sensors monitoring various turbomachine operating conditions to determine when a rub event is occurring. *See id.* at page 1, paragraph [0001].

The Application contains three independent claims, namely, claims 1, 3, and 4, all of which are the subject of this Appeal. The subject matter of these claims is summarized below.

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specification and drawings. By way of example, an embodiment in accordance with the present invention relates to a system for detecting a rub in a turbomachine (e.g., 10). *See, e.g., id.* Fig.1. The system includes sensors for monitoring turbomachine conditions; and an on site monitor (e.g., 12) in communication with the sensors, and loaded with instructions to implement a method for detecting whether a rub is occurring in the turbomachine. *See e.g.,* page 4, paragraph [0025], and page 5, paragraph [0026].

With regard to the aspect of the invention set forth in independent claim 3, discussions of the recited features of claim 3 can be found at least in the below cited locations of the specification and drawings. By way of example, a technique in accordance with the present invention relates to a method for detecting a rub in a turbomachine (e.g., 10). The method comprises monitoring turbomachine conditions; and determining whether a rub is occurring. *See, e.g., id.* at page 5, paragraph [0026]; *see also id.,* at page 7, paragraph [0030].

With regard to the aspect of the invention set forth in independent claim 4, discussions of the recited features of claim 4 can be found at least in the locations of the specification and drawings cited below. By way of example, an embodiment in accordance with the present invention relates to a storage medium encoded with a machine-readable computer program code for detecting whether a rub is occurring in a turbomachine (e.g., 10). *See, e.g., id.,* paragraph [0029] and paragraph [0044]. The storage medium includes instructions for causing a computer to implement a method that includes obtaining data indicating turbomachine conditions; and determining whether a rub is occurring. *See, e.g., id.,* paragraph [0029] and paragraph [0044].

As is clear from the description of the independent claims, the Appellants' invention includes a system and method for monitoring turbomachine conditions; and determining whether a rub is occurring or not. A benefit of the invention, as recited in these claims, is the ability to provide automatic detection of possible rub events using standard sensors and data usually already installed on and around a turbomachine and communicated to an on site monitoring system. The disclosed embodiments do not require costly hardware for vibration signal conditioning for rub detection.

This is a clear difference and distinction from the prior art, as discussed below.

6. **GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

**First Ground of Rejection for Review on Appeal:**

Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 1, 3, and 4 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application No. 2003/0222604 (hereinafter "Twerdochlib").

**Second Ground of Rejection for Review on Appeal:**

Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claim 2 under 35 U.S.C. § 103(a) as being rendered obvious by Twerdochlib in view of U.S. Patent Application Publication 2003/0192328 (hereinafter "Kikuchi").

7. **ARGUMENT**

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Sections 102 and 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, as Appellants strongly believe that claims 1-4 are currently in condition for allowance.

A. **Ground of Rejection No. 1:**

The Examiner rejected claims 1, 3, and 4, under 35 U.S.C. § 102(e) as being unpatentable over Twerdochlib. While the Examiner rejected each of independent claims 1, 3, and 4 on the basis of Twerdochlib, each of these independent claims will be discussed separately below. Appellants respectfully traverse this rejection.

1. **Judicial precedent has clearly established a legal standard for a *prima facie* anticipation rejection.**

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985). Thus, for a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). Moreover, the prior art reference also must show the identical invention “*in as complete detail as contained in the ... claim*” to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Accordingly, Appellants need only point to a single element not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter.

2. **The Examiner’s rejection of 1, 3, and 4 is improper because the Twerdochlib does not disclose or suggest all of the claimed elements.**

Independent claim 1 recites:

A system for detecting a rub in a turbomachine comprising;  
a turbomachine;  
sensors monitoring turbomachine conditions; and  
an on site monitor in communication with the sensors, and loaded with instructions to implement a method for *detecting whether a rub is occurring in the turbomachine*.  
(Emphasis Added)

Independent claim 3 recites:

A method for detecting a rub in a turbomachine, the method comprising:  
monitoring turbomachine conditions; and  
*determining whether a rub is occurring.* (Emphasis Added)

Independent claim 4 recites:

A storage medium encoded with a machine-readable computer program code for detecting whether a rub is occurring in a turbomachine, the storage medium including instructions for causing a computer to implement a method comprising:  
obtaining data indicating turbomachine conditions;  
and  
*determining whether a rub is occurring.* (Emphasis Added)

**Twerdochlib fails to teach determining whether a rub is actually occurring.**

The Examiner stated that Twerdochlib discloses “whether a rub is occurring” on page 3, sections 47-50 of the reference. The reference actually indicates that Twerdochlib’s system generates an alarm that certain actions should be taken, and “if not 17 rub will occur”. See Twerdochlib, section 48. As pointed out in the Appellants’ Final Office Action Response, by stating “*if not 17 rub will occur*” in section 48, Twerdochlib clearly fails to indicate that a rub *is actually occurring* or has already occurred. The statement of “*if not 17 rub will occur*”, on the contrary, is a conditional scenario described in future tense. Even the grammatical interpretation of the statement “*if not 17 rub will occur*” indicates that a rub may occur *only in future*. When the condition is determined and the alarm made, no rub will actually have ever occurred. ***Twerdochlib indeed is designed to avoid any rub occurrence.*** Moreover, due to its very design, the Twerdochlib system is incapable of such determination, and would be destroyed by an actual rub.

Appellants respectfully submit that Twerdochlib teaches a method of detecting the *clearance between a rotating blade and a stationary portion of a turbo-machine* as opposed to *detecting "rub"*. The distinction between "clearance" and "rub" is apparent from passages of the present application, particularly in paragraph 2, lines 10 – 14, and paragraph 3, lines 4 – 8.

Further, Appellants respectfully submit that the method taught by Twerdochlib employs a technique involving eddy current testing systems coupled to pulsed eddy current probes for detecting voids, cracks, and corrosion in metal objects, as described on page 1, section 7 of the reference. The method ceases to work when actual contact between two rubbing surfaces occurs. Indeed, the sensing devices would be destroyed by such contact.

Twerdochlib teaches, such as on page 3, section 50, how the detection system and method go into a non-detecting sleep mode should an actual contact ever occur. The passage reads:

Electrical continuity of the search coil 30 is continually monitored by the computer 50. Should electrical continuity or the proximity signal be lost as a result of unplanned contact with the blade, the insertion probe is returned to a retracted position and placed in a "sleep" mode.

*See*, Twerdochlib, page 3, section 50.

Thus, the system is actually designed specifically to *stop detecting clearance and retract* even before any actual rub can occur.

Appellants note that this is *not* the equivalent of detecting when a rub is occurring. Twerdochlib's system *ceases to function and becomes inoperative* in the event that any contact of the blades occurs. This is not the intent of the system. Rather the system is clearly intended to avoid any such events. As noted above, the Board need only review the overall configuration and operation of the Twerdochlib system to

appreciate that the sensing devices would necessarily be retracted and cease to measure clearance prior to an actual rub event. Otherwise the system would be damaged, as recognized and avoided by Twerdochlib's own teachings.

Because Twerdochlib teaches detecting clearance and not whether rub is occurring, Twerdochlib cannot anticipate independent claims 1, 3, and 4. Thus, it is respectfully requested that the rejection of claims 1, 3, and 4 under 35 U.S.C 102(e) be withdrawn.

The Examiner has stated in the Advisory action that

Applicant argues in the argument that the prior art does not show the 'whether rub is occurring' (page 3), but later the Applicant also suggests the prior art does teach 'whether a rub is occurring' (page 4).

The Appellants respectfully disagree with the above conclusion drawn by the Examiner based on Appellants argument on page 3 and page 4 of the Final Action Response. Nowhere do the Appellants suggest that the prior art teaches detection that "a rub is occurring". Appellants have been consistent in their line of reasoning that Twerdochlib does not teach *any* occurrence of a rub or detection of such events. Appellants would request the Board to reverse this point as well.

**B. Ground of Rejection No. 2:**

The Examiner rejected claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Twerdochlib in view of Kikuchi. Appellants respectfully traverse this rejection.

**1. Legal basis required to establish a *prima facie* case of obviousness.**

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination.



*ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes all of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988).

2. **Neither Twerdochlib nor Kikuchi teach determining whether a rub is actually occurring.**

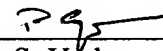
As discussed above for independent claim 1, Twerdochlib fails to teach detection of whether *rub is occurring* in the turbomachine. Kikuchi similarly fails to teach such analysis. Thus, neither Twerdochlib nor Kikuchi specifically teach, disclose, or suggest detection of whether *rub is occurring* in the turbomachine. Therefore, the *combination* of the references cannot render independent claim 1 or its dependent claim 2 obvious. Accordingly, Appellants respectfully submit that a *prima facie* case of obviousness cannot be supported by the references with respect to claim 2. Thus, it is respectfully requested that the rejection of claim 2 under 35 U.S.C 103(a) be withdrawn.

**Conclusion**

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: 2/28/2006

  
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Patrick S. Yoder  
Reg. No. 37,479  
FLETCHER YODER  
P.O. Box 692289  
Houston, TX 77269-2289  
(281) 970-4545

8. **APPENDIX OF CLAIMS ON APPEAL**

**Listing of Claims:**

1. (previously presented) A system for detecting a rub in a turbomachine comprising;  
a turbomachine;  
sensors monitoring turbomachine conditions; and  
an on site monitor in communication with the sensors, and loaded with instructions to implement a method for detecting whether a rub is occurring in the turbomachine.
2. (original) The system of claim 1 further comprising a server in communication with the on site monitor via an internet.
3. (original) A method for detecting a rub in a turbomachine, the method comprising:  
monitoring turbomachine conditions; and  
determining whether a rub is occurring.
4. (previously presented) A storage medium encoded with a machine-readable computer program code for detecting whether a rub is occurring in a turbomachine, the storage medium including instructions for causing a computer to implement a method comprising:  
obtaining data indicating turbomachine conditions; and  
determining whether a rub is occurring
- 5.-50. (canceled).

9. **APPENDIX OF EVIDENCE**

None.

10. **APPENDIX OF RELATED PROCEEDINGS**

None.